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| EXAMINER | |
|---|---|
| CANTELMO, GREGG | |
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| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/811,484 | SAMMES ET AL. | |
| | Examiner | Art Unit | |
| | Gregg Cantelmo | 1745 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) *18,19 and 34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15,17,20-28 and 30-33* is/are rejected.

7)☒ Claim(s) *16 and 29* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 August 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *see office action*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-17 and 20-33, drawn to an extrusion method, classified in class 264, subclass 634.

   II. Claim 18, 19 and 34, drawn to a solid oxide fuel cell, classified in class 429, subclass 31.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by other processes such as sintering, molding, or coating the tube on a removable mandrel.

3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Mr. David E. Rodrigues on March 2, 2007 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-17 and 20-33. Affirmation of this election must be made by applicant in replying to this Office action. Claims 18, 19 and 34 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Priority***

6. Claim to provisional application serial No. 60/458,280, filed March 27, 2003 is acknowledged.

***Information Disclosure Statement***

7. The information disclosure statements filed on August 11, 2004 and October 14 2004 have been placed in the application file and the information referred to therein has been considered as to the merits.

***Drawings***

8. The drawings were received on August 11, 2004. These drawings are approved for examination purposes.

***Claim Objections***

9. Claim 33 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 20 is to a method of forming a solid oxide fuel cell. Claim 33 does not further define the method of making the claimed solid oxide fuel cell but is directed to a method of using the solid oxide fuel cell. It fails to further define the method.

***Claim Rejections - 35 USC § 101***

10. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 33 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

As discussed above, claim 33 fails to clearly define further method steps of making the solid oxide fuel cell but instead recites power density of the cell dependent upon an open circuit voltage. Claim 33 does not appear to be a proper process claim since it is defining a materially different process, in this case a use of the solid oxide fuel cell (product) produced by the method of claim 20. Applicant is advised to cancel claim 33 to overcome this rejection.

***Claim Rejections - 35 USC § 112***

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 25, 30, 31 and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 25 recites variations which are greater than their respective +/- variations in claim 20. For example in claim 20, the wall thickness has what appears to be a variation in thickness of +/- 0.2 mm whereas claim 25 recites a variation in thickness of the wall being about 0.1mm to about 1 mm. Thus the scope of the variation in claim 25 appears to extend outside the range of claim 20 thus rendering claim 25 indefinite.

b. Claims 30 and 31 recite anode and cathode materials "derived" from a genus of respective materials. The term "derived" renders the exact scope of each genus indefinite since it is unclear as to what derivatives the claims are limited to. Applicant is advised to replace the term "derived" with proper Markush language to overcome this rejection;

c. Claim 33 provides for the use of the product produced by the method of claim 20, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced. Applicant is advised to cancel claim 33 to overcome this rejection.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

12. Claims 1, 2, 5, 13, 20 and 25 are rejected under 35 U.S.C. 102(a) as being anticipated by Du et al. "Extruded Tubular Strontium- and Manganese-Doped Lanthanum Gallate, Gadolinium-Doped Ceria, and Yttria-Stabilized Zirconia" (hereafter referred to as Du-2002).

It appears that this publication was electronically available on November 21, 2002. With that as the date of public disclosure, and given the earliest effective filing date of the instant application to be March 27, 2003, this publication qualifies under 35 U.S.C. 102(a).

Du-2002 discloses a method of manufacturing a green electrolyte tube and a solid oxide fuel cell comprising: forming a composition comprising lanthanum-strontium-gallium-magnesium oxide powder and a binder into a green electrolyte tube (abstract). The outer diameter of the green electrolyte tube has a tolerance of less than or equal to about +0.3 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about +0.2 millimeters over a length of greater than or equal to about 5 millimeters (see page A75, first column, lines 1-4 as applied to claim 1).

The forming is accomplished by extrusion (title as applied to claim 2).

The extrudate is sintered so that the outer diameter of the green electrolyte tube has a tolerance of less than or equal to about +0.3 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about +0.2 millimeters over a length of greater than or equal to about 5 millimeters (see first paragraph under Experimental on page A74 and also see page A75, first column, lines 1-4 as applied to claim 5).

The outer diameter of the green electrolyte tube has a tolerance of less than or equal to about +0.3 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about +0.2 millimeters over a length of greater than or equal to about 5 millimeters (see page A74, first column, lines 1-4 as applied to claims 13 and 25).

As to claim 33: Claim 20 is to a method of forming a solid oxide fuel cell. Claim 33 does not further define the method of making the claimed solid oxide fuel cell but is directed to a method of using the solid oxide fuel cell. It fails to further define the method. Since claim 30 does not further define claim 20 and since claim 20 is rejected for the reasons set forth above, claim 30 is also rejected for the same reasons discussed and applied to claim 20.

***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 1-3, 5, 6, 8, 9, 13, 14, 17, 20, 21, 25-27 and 33 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious

over Du et al. "Fabrication of tubular electrolytes for solid oxide fuel cells using strontium- and magnesium-doped LaGaO3 materials" (hereafter referred to as Du-2001).

Du-2001 discloses forming a composition comprising lanthanum-strontium-gallium-magnesium oxide powder and a binder into a green electrolyte tube, having an outer diameter and a wall thickness. The tubes have a length of 200-300 mm, inside diameter of 2.4-2.5mm and wall thickness of 0.3-0.4 mm (abstract as applied to claim 1).

The material described above is formed by extrusion (abstract as applied to claim 2).

The raw materials are mixed into a workable paste which is held to be an equivalent of a dough (page 728, first column, last paragraph as applied to claim 3).

The extrudate is completely dried and then sintered at a temperature of 1450-1520°C and a dwell time of 2-72 hours (page 728, column 2, first paragraph (as applied to claim 5).

The La-Sr-Ga-Mg-O powder has an average particle size of less than 1 micrometer as can be see in Fig. 6 relative to the ball milling process. The aim disclosed therein is to significantly reduce the number of large particles (> 10 micrometers) in favor of fine particles ( < 1 micron). From this one of ordinary skill in the art would reasonably conclude that the average particle size is desirably less than 1 micrometer which improves the surface smoothness and density of the end product (as applied to claim 6). The amount of additives mixed with the La-Sr-Ga-Mg-O powder

include a binder, solvent, surfactant and plasticizer. The sum of the binders, solvent remaining in the slurry when extruding, surfactant and plasticizer shown in Table 1 and in the first paragraph on page 732, column 2 includes a sum which is between 5 and 40 wt% of the slurry. Thus the remaining portion of the slurry is the La-Sr-Ga-Mg-O powder material itself falling within the range of 60-95 wt % of the total composition (as applied to claim 6).

AMP-95 is provided as a surfactant/pH control agent (page 731, second column) and is present in an amount of 0-1.8 wt % (Table 1 as applied to claim 8).

The binder is one of Duramax B1051 or B1052 in an amount of at least 8wt% of he total weight of the composition (see Table 1 as applied to claim 9).

The electrolyte tube is dried in air prior to sintering (see section 3.5 and page 728, second column, ll. 1-3 as applied to claim 14).

The extrudate is completely dried and then sintered at a temperature of 1450-1520°C and a dwell time of 2-72 hours (page 728, column 2, first paragraph (as applied to claim 17).

Du-2001 discloses forming a composition comprising lanthanum-strontium-gallium-magnesium oxide powder and a binder into a green electrolyte tube, having an outer diameter and a wall thickness. The tubes have a length of 200-300 mm, inside diameter of 2.4-2.5mm and wall thickness of 0.3-0.4 mm. The material described above is formed by extrusion and thereafter sintered (as discussed above). Thereafter both an anode and cathode are disposed on the electrolyte tube to form the requisite solid oxide fuel cell (as applied to claim 20).

The La-Sr-Ga-Mg-O powder has an average particle size of less than 1 micrometer as can be see in Fig. 6 relative to the ball milling process. The aim disclosed therein is to significantly reduce the number of large particles (> 10 micrometers) in favor of fine particles ( < 1 micron). From this one of ordinary skill in the art would reasonably conclude that the average particle size is desirably less than 1 micrometer which improves the surface smoothness and density of the end product (as applied to claim 21). The amount of additives mixed with the La-Sr-Ga-Mg-O powder include a binder, solvent, surfactant and plasticizer. The sum of the binders, solvent remaining in the slurry when extruding, surfactant and plasticizer shown in Table 1 and in the first paragraph on page 732, column 2 includes a sum which is between 5 and 40 wt% of the slurry. Thus the remaining portion of the slurry is the La-Sr-Ga-Mg-O powder material itself falling within the range of 60-95 wt % of the total composition (as applied to claim 21).

The electrolyte tube is dried in air prior to sintering (see section 3.5 and page 728, second column, ll. 1-3 as applied to claim 26).

The extrudate is completely dried and then sintered at a temperature of 1450-1520°C and a dwell time of 2-72 hours (page 728, column 2, first paragraph (as applied to claim 27)).

As to claim 33: Claim 20 is to a method of forming a solid oxide fuel cell. Claim 33 does not further define the method of making the claimed solid oxide fuel cell but is directed to a method of using the solid oxide fuel cell. It fails to further define the method. Since claim 30 does not further define claim 20 and since claim 20 is rejected

for the reasons set forth above, claim 30 is also rejected for the same reasons discussed and applied to claim 20.

Du-2001 does not expressly teach of the outer diameter of the green electrolyte tube has a tolerance of less than or equal to about +0.3 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about +0.2 millimeters over a length of greater than or equal to about 5 millimeters (claims 1, 5 and 20); wherein the outer diameter of the green electrolyte tube has a tolerance of less than or equal to about +0.2 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about +0.15 millimeters over a length of greater than or equal to about 5 millimeters (claim 13); or wherein the extruded tube has a variation in outer diameter of about 2 millimeters to about 10 millimeter and a variation in wall thickness of about 0.1 millimeters to about 1 millimeter (claim 25).

However Du-2001 appears to form the same composition under the same process conditions and there is a reasonable expectation that the prior art product of Du-2001 will inherently exhibit the same properties.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is based on the fact that Du-2001 appears to form the same composition under the same process conditions and hence there is a reasonable expectation that the prior art product of Du-2001 will inherently exhibit the same properties.

The Examiner requires applicant to provide that that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

In the alternative given the similarities between the teachings of the prior art and the instant invention, notably the process of making the product described therein, even if it is shown that there are differences between the tolerances of the prior art and that of

the instant claims, these differences would be held to be minor differences and a prima facie case of obviousness would be established.

14. Claims 1-6, 8, 9, 12, 14, 17, 20, 21, 25-27 and 30-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Du et al. "Electrical Performance of LaGaO3-Based Tubular SOFCs" (hereafter referred to as Du-2002) as evidenced by Du-2001.

Du-2002 discloses forming a composition comprising lanthanum-strontium-gallium-magnesium oxide powder and a binder into a green electrolyte tube, having an outer diameter and a wall thickness. The tubes are formed using the process discussed in Du-2001 above (see page 39, first sentence under section 1.1 as applied to claim 1).

The material described above is formed by extrusion (abstract as applied to claim 2).

The raw materials are mixed into a workable dough (first paragraph under section 1.1 on page 39 as applied to claim 3).

The paste is mixed in a blade mixer (first paragraph under section 1.1 on page 39 as applied to claim 4).

The extrudate is completely dried and then sintered at a temperature of 1450-1520°C and a dwell time of 2-72 hours (page 728, column 2, first paragraph (as applied to claim 5).

As discussed in Du-2001 above, incorporated into the experimental teachings of Du-2002: The La-Sr-Ga-Mg-O powder has an average particle size of less than 1 micrometer as can be see in Fig. 6 relative to the ball milling process. The aim disclosed therein is to significantly reduce the number of large particles (> 10

micrometers) in favor of fine particles ( < 1 micron). From this one of ordinary skill in the art would reasonably conclude that the average particle size is desirably less than 1 micrometer which improves the surface smoothness and density of the end product (as applied to claim 6). The amount of additives mixed with the La-Sr-Ga-Mg-O powder includes a binder, solvent, surfactant and plasticizer. The sum of the binders, solvent remaining in the slurry when extruding, surfactant and plasticizer shown in Table 1 and in the first paragraph on page 732, column 2 includes a sum which is between 5 and 40 wt% of the slurry. Thus the remaining portion of the slurry is the La-Sr-Ga-Mg-O powder material itself falling within the range of 60-95 wt % of the total composition (as applied to claim 6).

As discussed in Du-2001 above, incorporated into the experimental teachings of Du-2002: AMP-95 is provided as a surfactant/pH control agent (page 731, second column) and is present in an amount of 0-1.8 wt % (Table 1 of Du-2001 and first paragraph under section 1.1 on page 39 of Du-2002 as applied to claim 8).

As discussed in Du-2001 above, incorporated into the experimental teachings of Du-2002: The binder is one of Duramax B1051 or B1052 in an amount of at least 8wt% of he total weight of the composition (see Table 1 of Du-2001 and first paragraph under section 1.1 on page 39 of Du-2002 as applied to claim 9).

A vacuum (28 mm Hg) is applied to the mixing chamber to degas the dough (sentence bridging pages 39 and 40 of Du-2002 as applied to claim 12).

The electrolyte tube is dried in air prior to sintering (see page 40, ll. 4-5 as applied to claim 14).

The extrudate is completely dried and then sintered at a temperature of 1500°C for 6 hours (page 40, ll. 4-5 as applied to claim 17).

Du-2002 discloses forming a composition comprising lanthanum-strontium-gallium-magnesium oxide powder and a binder into a green electrolyte tube, having an outer diameter and a wall thickness. The material described above is formed by extrusion and thereafter sintered (as discussed above). Thereafter both an anode and cathode are disposed on the electrolyte tube to form the requisite solid oxide fuel cell (see page 40, section 1.2 Cell Preparation as applied to claim 20).

The La-Sr-Ga-Mg-O powder has an average particle size of less than 1 micrometer as can be see in Fig. 6 relative to the ball milling process. The aim disclosed therein is to significantly reduce the number of large particles (> 10 micrometers) in favor of fine particles ( < 1 micron). From this one of ordinary skill in the art would reasonably conclude that the average particle size is desirably less than 1 micrometer which improves the surface smoothness and density of the end product (as applied to claim 21). The amount of additives mixed with the La-Sr-Ga-Mg-O powder includes a binder, solvent, surfactant and plasticizer. The sum of the binders, solvent remaining in the slurry when extruding, surfactant and plasticizer shown in Table 1 and in the first paragraph on page 732, column 2 includes a sum which is between 5 and 40 wt% of the slurry. Thus the remaining portion of the slurry is the La-Sr-Ga-Mg-O powder material itself falling within the range of 60-95 wt % of the total composition (see Du-2001, incorporated into Du-2002 as applied to claim 21).

The electrolyte tube is dried in air prior to sintering (see page 40, ll. 4-5 as applied to claim 26).

The extrudate is completely dried and then sintered at a temperature of 1500°C for 6 hours (page 40, ll. 4-5 as applied to claim 27).

The anode is derived from nickel oxide, cobalt oxide, nickel oxide with yttrium stabilized zirconia, nickel oxide with samarium doped ceria (see page 40, first paragraph under section 1.2 Cell preparation). The fired anode coat being 15-20 micrometers thick (see page 40, second paragraph under section 1.2 Cell preparation as applied to claim 30).

The cathode is derived from lanthanum strontium cobalt (LSCO) and samarium strontium cobalt (SmSrCo) as discussed on page 40, first paragraph under section 1.2 Cell preparation). The fired cathode coat being 20-30 micrometers thick (see page 40, second paragraph under section 1.2 Cell preparation as applied to claim 31).

An interlayer is disposed on the electrolyte which is derived from samarium doped ceria (SDC) having a thickness of about 10-15 micrometers (see page 40, first and second paragraphs as applied to claim 32).

As to claim 33: Claim 20 is to a method of forming a solid oxide fuel cell. Claim 33 does not further define the method of making the claimed solid oxide fuel cell but is directed to a method of using the solid oxide fuel cell. It fails to further define the method. Since claim 30 does not further define claim 20 and since claim 20 is rejected for the reasons set forth above, claim 30 is also rejected for the same reasons discussed and applied to claim 20.

Du-2002 does not expressly teach of the outer diameter of the green electrolyte tube has a tolerance of less than or equal to about +0.3 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about +0.2 millimeters over a length of greater than or equal to about 5 millimeters (claims 1, 5 and 20); wherein the outer diameter of the green electrolyte tube has a tolerance of less than or equal to about +0.2 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about +0.15 millimeters over a length of greater than or equal to about 5 millimeters (claim 13); or wherein the extruded tube has a variation in outer diameter of about 2 millimeters to about 10 millimeter and a variation in wall thickness of about 0.1 millimeters to about 1 millimeter (claim 25).

However Du-2002 appears to form the same composition under the same process conditions and there is a reasonable expectation that the prior art product of Du-2002 will inherently exhibit the same properties. Note that Du-2002 employs a mixture of commercial LSGM powder with a PEG-40 lubricant, AMP-95 pH control agent, B1051/B1052 binder and distilled water. This mixture is identical to that disclosed in the instant application. The mixture is then mixed in a blade mixture, and subjected to the same preferred vacuum conditions to degas the dough while the mixture is running. The mixture is then extruded using the same extruder (16-T ram extruder from Loomis Products Company) under a ram pressure of 5.5 tons which is within the ram pressure of the instant application. After extrusion, the extrudate is air-

dried and then sintered in an electrical furnace at 1500°C for 6 hours in air (see paragraph bridging pages 39 and 40).

Thus the process of Du-2002 is significantly identical to the process disclosed in the instant application and given these similarities it is reasonable to expect that the prior art product of Du-2002 would have exhibited the same tolerances as those recited in claims 1, 13 and 14, absent clear and convincing evidence to the contrary.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is based on the fact that Du-2001 appears to form the same composition under the same process conditions and hence there is a reasonable expectation that the prior art product of Du-2001 will inherently exhibit the same properties.

The Examiner requires applicant to provide that that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

In the alternative given the similarities between the teachings of the prior art and the instant invention, notably the process of making the product described therein, even if it is shown that there are differences between the tolerances of the prior art and that of the instant claims, these differences would be held to be minor differences and a prima facie case of obviousness would be established.

***Claim Rejections - 35 USC § 103***

15. Claims 7 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Du-2002, as evidenced by Du-2001, in view of Rohm and Hoss Co. "Duramax Binders for ceramic extrusion" (Hereafter referred to as Rohm and Hoss).

Du-2002 teaches of providing a PEG-400 lubricant but does not specify the amount of lubricant present.

Du-2001 which is relied upon in Du-2002 also teaches of using PEG-400 but in an amount of (see page 728, first column, first paragraph under heading 2 as applied to claims 7 and 22).

As shown in Table 1, PEG-400 is present in an amount about 6.6% (see Table 1 of Du-2001).

Neither Du-2002 nor Du-2001 teach of the PEG lubricant present in an amount in the range from 0.5 wt% to about 2.5 wt%.

Selection of the amount of lubricant below 6.6 wt% would have been readily apparent to one of ordinary skill in the art as evidenced by Rohm and Hass.

Therein Rohm and Hass teach of a binder for ceramic extrusion which includes the ceramic, a mixture of Duramax b1051 and b1052, AMP-95, PEG-400 and water. These components are identical to that of the materials in the instant application and thus provide a suitable mixture for extruding ceramic materials.

In this mixture, the PEG-400 lubricant is provided in a range from 0.5-1 wt% in order to enhance the surface smoothness of the extrudates and reduce extrusion pressure.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Du-2002 as evidenced by Du-2002 by modifying the amount of PEG-400 as taught by Rohm and Hass since it would have provided a sufficient amount of lubricant needed to enhance the surface smoothness of the extrudates and reduce extrusion pressure. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has

been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

16. Claims 10, 11 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Du-2002 as evidenced by Du-2001.

Du-2002 teaches of extruding using a T-ram extruder as discussed above and incorporated herein (applied to claim 10 and 23).

As discussed in Du-2001 above, incorporated into the experimental teachings of Du-2002: AMP-95 is provided as a surfactant/pH control agent (page 731, second column) and is present in an amount of 0-1.8 wt % (Table 1 of Du-2001 and first paragraph under section 1.1 on page 39 of Du-2002).

A vacuum (28 mm Hg) is applied to the mixing chamber to degas the dough (sentence bridging pages 39 and 40 of Du-2002).

Du-2002 does not teach of the claimed input energy during extrusion being about 1 to about 3 kilowatt-hour/kilogram (claims 10 and 23) or of the claimed input energy during extrusion being about 0.5 to about 2 kilowatt-hour/kilogram (claims 11 and 24).

Du-2002 teaches of the same process for forming the same electrolyte tube as disclosed in the instant application. Given the remarkable similarities between the instant application and the teachings of Du-2002, one of ordinary skill in the art of extruding ceramics would have found the claimed input energies to be obvious input energies useful in the process of making the ceramic electrolytes disclosed in Du-2002.

Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

17. Claims 15 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Du-2002 as evidenced by Du-2001 in view of U.S. Patent No. 5,106,295 (Misawa).

Neither Du-2002 nor Du-2001 teach of drying in the tube holder defined in claims 15 and 28.

Misawa discloses an apparatus for holding ceramic tubes during cooling of the tubes wherein the apparatus has two blocks 3 and 3' disposed on one another and wherein each block has a semi-cylinder cut out of it and wherein an inner diameter of the two blocks is greater than or equal to the diameter of the tube held within the block (see Fig. 1 as applied to claims 15 and 28).

This provides a device for holding the elongated ceramic tub in such a way that it is not subject to curving and thus maintains a high level of straightness when dried (col. 1, ll. 45-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Du-2002 by cooling the extruded ceramic tube in the cooling block of Misawa since it would have provided a device for holding the elongated ceramic tub in such a way that it would not have been subject to curving and thus maintained a high level of straightness when dried.

***Allowable Subject Matter***

18. Claims 16 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: none of the prior art of record appear to reasonably teach, suggest or render obvious the invention of either claims 16 or 29. In particular, the prior art of record fails to teach of the claimed holder design for the sintering step as recited in either claim 16 or 29.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gregg Cantelmo
Primary Examiner
Art Unit 1745

gc
march 7, 2007